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ABSTRACT

Interactive Research and Development on Teaching (IR&DT) was initially proposed as an alternative to linear educational research and development strategies that often resulted in irrelevant, uninterpretable, time consuming research that did not actively involve teachers. This paper reports on the insights gained from implementing the IR&DT strategy. Major insights discussed are: (1) nature of collaboration; (2) participant characteristics; (3) technical assistance requirements; (4) rigor and usefulness of research; (5) IR&DT as an intervention as well as a research strategy; (6) reduction of time lag between research, development, and implementation; and (7) cost effectiveness. Recommendations for further use of IR&DT are included along with a brief description of the IR&DT teams. (CJ)

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THE IR&DT EXPERIENCE

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THE IR&DT EXPERIENCE*

Interactive Research and Development on Teaching (IR&DT) was proposed in 1975 by Ward and Tikunoff as an alternative educational r and d strategy. The basis for this recommendation built from criticism of and demonstrated inadequacies of the more commonly used linear r, d, d, and i strategy wherein research (r) findings are developed (d) into materials and products, and disseminated (d) to appropriate educational practitioners for implementation (i) in classrooms and for studying the effects of that implementation. Among these criticisms are: (1) The functions of r, d, d, and i are conceptualized as separate entities and tend to be conducted by persons knowledgeable about but usually not involved in the processes of classroom instruction. As a result, research frequently is conducted on questions teachers did not ask in the first place, rendering the utility of the research to be questionable at best. (2) When important and needed outcomes are obtained, findings usually are presented in language that is largely unfamiliar and uninterpretable at the classroom level. (3) The teacher is viewed as a "consumer" and "adoptee" of r and d outcomes rather than as a participant in the process of school improvement. (4) Finally, in a linear approach, because each step in the r and d process is discrete and separated from the others, the time required

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Limited copies of the complete technical report of the IR&DT Study are available: Tikunoff, W.J., Ward, B.A., and Griffin, G.A. Interactive Research and Development on Teaching Study. Far West Laboratory for Educational Research and Development, 1979, Report No. IR&DT 79-11. Price: $15.00 handling charge.

from research to classroom application, if and when it occurs, often is 5-10 years.

The title, Interactive Research and Development, was selected purposefully to give prominence to the undergirding principles of the strategy. IR&DT places teachers, researchers, and trainer/developers together to inquire as a team - beginning with the initiation of the r and d process - into those questions, problems and concerns of classroom teachers. An IR&DT team is charged with conducting research and concurrently attending to the development of training based both on their research findings and the research methods and procedures employed in their study. Decisions are made collaboratively. For IR&DT, this means that each member of the team has parity and shares equal responsibility for the team's decisions and actions, from identification of the question/problem through completion of all resultant r and d activities.

Under funding by the National Institute of Education, IR&DT was implemented and studies from August 1977 through November 1978 at two sites - one in an urban setting in California, the other in a rural setting in Vermont. The settings were selected purposely in order to ensure diverse circumstances for the implementation study.

This paper reports some of the insights regarding collaborative r and d that were gained from the IR&DT Study. Information about the research conducted by the California and Vermont teams and extensive data related to these insights are contained in the complete IR&DT Report (see footnote reference, page 1). Data were obtained by on-site observations, analysis of audio-recordings of all team meetings, analysis of team member and Far West Laboratory staff logs, interviews with participants and other relevant persons at each site, and use of a jury system questionnaire and ratings in order to

establish the quality of IR&DT products in relation to two generic criteria, rigor and utility.

A discussion follows of seven major insights. These are related to: (1) the nature of collaboration; (2) characteristics of the participants; (3) technical assistance requirements; (4) rigor and usefulness of r&d; (5) reduction of time lag between research, development and use; (6) IR&DT as an intervention as well as a research strategy; and (7) cost effectiveness of IR&DT. Recommendations for future use of IR&DT are included at the end of the paper. First, however, a brief description of each IR&DT team is presented as background.

IR&DT Team Composition

As indicated, two teams of teachers, researchers, and trainer/developers* implemented the IR&DT strategy in order to provide diverse situations for its study. They were designated as the California team and the Vermont team.

The California team. The California site was located in the San Diego Unified School District, San Diego, California, the ninth largest municipality in the United States. This is a large, urban public school system which served 118,697 students in the 1977-78 school year. Team members included four teachers, one researcher, and one trainer/developer, all on the school district staff.

Three teachers (at kindergarten, 1st and 2nd grades) taught in an elementary school in a lower socio-economic neighborhood. The 1977-78 the student enrollment in the school was approximately 400 with 75 percent Black, 20

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* The term, trainer/developer, is used throughout this discussion to designate that role assumed by a person in order to carry out the development functions. Typically, this is a staff developer at a local education agency and a teacher educator or teacher trainer at an institution of higher education.

percent Hispanic, 3 percent Asian American, and 2 percent white students. Eighty-five percent of the students were eligible for free lunch and an additional 13 percent qualified for reduced-price lunch. The fourth teacher taught a combination 3rd-4th grade class in another elementary school in the district. This school served 1200 students, 77 percent of whom were white, 11 percent Hispanic, 9 percent Asian American, and 3 percent Black. Both schools included innovative programs - the first included Follow Through, the California School Improvement Program, and ESEA Title I and other categorical aid efforts; the second conducted a special district-wide program for gifted students.

The researcher on the California team was on the district's research and evaluation staff. He had taught high school mathematics and had served as a resource teacher for the district prior to becoming a program evaluator.

The trainer/developer was employed as a curriculum resource teacher in the staff development office of the school district. Prior to undertaking this assignment, he had taught sixth grade for 11 years.

The Vermont team. The Vermont site included two cooperating institutions - the College of Education and Social Services, University of Vermont, and the Underhill Independent School District.

In 1977-78, the college - located in Burlington, Vermont, a city of some 40,000 people - served approximately 1,000 students, of whom some 120 were enrolled in the preservice elementary teaching program.

The school district is part of a supervisory union school district which is a loosely connected federation of seven small independent districts, each with its own board of education but served by one superintendent and his staff. The Underhill Independent District includes only one school, an elementary

school serving grades Kindergarten through four. In 1977-78, the school enrolled 130 students, most of whom were white. The faculty was comprised of five teachers including the teacher/principal.

The Vermont IR&DT team included three teachers who taught in the Underhill School at Kindergarten, grade 1 and grade 3, one researcher, and two trainer/developers, one who worked with the team for the first two months of IR&DT implementation and one who was on the team from the middle of the third month of implementation through the completion of the process.

The researcher and both trainer/developers were on the faculty of the College of Education and Social Services at the University of Vermont. The researcher had had two years' teaching experience. Both trainer/developers had taught school, the second having had more teaching experience than the first. The researcher had completed a doctoral degree, the trainer/developers both had Masters' degrees (the second was involved in doctoral studies while participating in the IR&DT effort). None of the teachers on the Vermont team had advanced degrees.

Underhill School previously had been involved in no innovative educational programs or projects. The College had planned and implemented several innovative preservice teacher training programs, one of which had won national recognition.

Nature of Collaboration

Collaborative approaches to educational r and d may assume a variety of configurations. Within IR&DT, collaboration is hypothesized as being present when there is:

- parity among team members,
- equal responsibility among team members in working through the r and d,

- working with as opposed to working on teachers,
- assumption of work by team members based upon their role expertise,
- assistance across roles as tasks are identified,
- emergent or issue-specific leadership as opposed to designated or appointed leadership.

Findings demonstrated that, within the broad rubric of parity, i.e., equal ability to gain the attention of team members, researcher members of both teams were likely to participate more extensively in team meetings than other individual team members because of their knowledge and skill related to research methodologies (the California researcher contributing 24.14 percent) of the input across all team meetings and the Vermont researcher 26.15 percent). However, when teacher representation on the team was viewed as the product of all teachers representing one role function, the teacher input was higher than that of the researcher or trainer/developer (59.36 percent for the California team and 52.25 percent for the Vermont team).

Regardless, the implementation of IR&DT demonstrates that the need for role expertise may be at odds with a simplistic notion of parity. For example, to deny team members the opportunity to learn from and react to the researcher during the research phase of their work only to maintain some equality in terms of time and attention would have been senseless. Parity has to be considered in concert with the needs of the team. The California and Vermont IR&DT teams attended systematically and sensitively to the issue of parity while at the same time acknowledging the need to provide for inclusion of certain "role" member skills when they were of potential utility.

Regarding responsibility for equal assumption of role-related functions in dealing with r and d problems, the two teams appeared to demonstrate

different patterns of behavior. The California team was more participatory than the Vermont team in terms of r and d relevant interactions, whereas both teams were participatory in dealing with issues of collegiality and what might be termed personal support. Analysis of formal team meetings, interviews with participants, and analysis of correspondence indicated that the Vermont team depended to a considerably larger extent than the California team on the assumption of responsibility for the r and d designs and final reports by the researcher and the trainer/developer. The California teachers actively participated in all phases of the r and d including report writing. Further, the California team engaged in more substantive and procedural discourse regarding r and d procedures and products (especially the formal, written ones) than the Vermont team.

In short, the California team conducted an r and d effort that was more consistent with the IR&DT definition of collaboration than the Vermont team.

Participant Characteristics

As noted earlier, an IR&DT team is composed minimally of one or more teachers, a researcher, and a trainer/developer. Inasmuch as the California and Vermont teams differed in (a) background and experience, (b) the manner in which they implemented IR&DT, and (c) the rigor and usefulness judgments given their research and development outcomes, relationships among these variables were explored.

Beginning with the orientation sessions and proceeding throughout the implementation period, the California team dealt with r and d issues systematically, persistently, and methodically. As noted above, the team's procedures also were characteristized by high involvement of all team members at each stage of the process. This involvement took different forms - shared

responsibility alternating with specific group-mandated assignments for certain tasks and with whole-group critique and revision - which, taken altogether, were sequential and rational.

The Vermont team, again from the orientation period throughout the study, illustrated a more erratic, less rational pattern. Particularly during the early stages of the implementation period, the Vermont group's efforts were somewhat sporadic in terms of coming to grips with the essentials of the r and d process. The team's apparent preoccupation with the personal-social dimensions of its members' relationships may have influenced the degree to which it could effectively and efficiently accomplish its primary IR&DT missions: the formulation and conduct of r and d on teaching.

This raises the important question of why this difference was present. For the most part, this can be explained by looking at team members' knowledge, skills, and performance.

Based on the role contributions hypothesized as being necessary for a successful IR&DT team, the teachers in both California and Vermont demonstrated the knowledge and skills related to teaching that were considered important. However, based on implementation findings, the California teachers were more aware of and sensitive to the complexity of the classroom environment than were their Vermont counterparts. To some extent, this difference may be explained by the institutional contexts in which the teachers worked. The California teachers had experienced the benefits and frustrations of working in a large, urban, multidimensional school system with a long and sustained history of professional development activities, special school improvement projects, and other opportunities to extend and deepen their understanding of classroom practice. The Vermont teachers were members of a significantly less

complex school system which included only one school, provided few inservice opportunities, and isolated the teachers from other professionals.

These relative differences between teacher members of the two teams, in terms of prior experience related to "special" innovative program activities, are considered to be critical to the process and product of IR&DT. The California team's teachers had had experiences which were aligned with the assumed requirements of IR&DT - using teaching as a base for changing institutional behavior, responding to and engaging in externally-required information gathering and report writing, working on school improvement projects, participating regularly in professional development activities, and the like. The idea that IR&DT was somehow "exotic" to the setting was expressed only minimally by the California team's teachers but was pronounced for the Vermont team's teachers. What might be concluded is that the IR&DT experience was better accomplished by teachers who had had other similar experiences during the course of enacting their professional roles.

The California researcher was found to align more closely with the hypothesized need to be knowledgeable about and skillful in approaching the conduct of educational research in a broad and multidimensional manner than was the Vermont researcher. One explanation for this finding may reside in the fact that the California researcher completed his doctoral dissertation during the course of IR&DT implementation whereas the Vermont researcher had completed his graduate work some time prior to his participation in the project. Also, the California researcher, by virture of his position in the school system, was regularly engaged in studying the complexities of teaching and learning whereas the Vermont researcher had been more immediately involved in the formulation and demonstration of a model teacher education program.

Both researchers demonstrated the desired combination of (a) willingness to move beyond already-known research paradigms and technologies, and (b) effectiveness in sharing their acquired knowledge and skill with other team members.

One phenomenon that was observed during IR&DT implementation was an apparent reluctance on the part of the researcher on the Vermont team to assume substantive leadership during the early research phase of the project. Although the researcher was acknowledged by the team members as the leader throughout the implementation period, the nature of his leadership was, for some time, more procedural and human-relations oriented than it was research oriented. This was reflected in differences in patterns of collaborative participation by team members at the two sites. While the California team engaged in systematic discussion, formulation, review, critique, and revision cycles at almost every step of the IR&DT process, the Vermont team only began to assume a systematic approach to their work when they entered the data collection step in their research. Further, based on percent of total monitored talk segments for all IR&DT team members during the total IR&DT implementation period, the California team devoted 74 percent to research-related talk, 14 percent to development-related talk, and 12 percent to other talk. The Vermont team devoted 56 percent to research-related talk, 12 percent to development-related talk, and 42 percent to other talk.

The trainer/developer on an IR&DT team is expected to demonstrate knowledge and skill in the application of research outcomes and methods to training programs and to be aware of ways to deliver training processes and products to potential client groups efficiently and effectively.

The original Vermont trainer/developer was observed by Far West Laboratory staff and by team member colleagues to be confused about his role on the team, persistently lacking in focus for his work on IR&DT, and, to a degree, in a position of rivalry with the team's researcher. The trainer/developer who replaced the original person can be characterized as task-oriented, supportive of colleagues, and persistent.

Both the California and the second Vermont trainer/developer demonstrated the positive contributions to IR&DT that were specified for the role, although different vantage points and different emphases were exhibited by each. The California trainer/developer had taught eleven years in elementary schools and experienced five years as a curriculum resource teacher, all of these experiences taking place in San Diego. This accumulation of understanding regarding the problems and issues in that school setting was seen as having had positive effect in terms of the trainer/developer's knowledge of the system at both conceptual and strategy levels. The Vermont trainer/developer, although working in several school districts in a cooperative teacher education program which provided preservice students experience in public school programs, had as her primary workplace a university college of education. Thus, she was at least one step removed from the issues and problems faced daily by the teachers and others in the school systems with which she interacted. These differences in the trainer/developers, essentially institutional in nature, are believed to be related to the degree to which they were knowledgeable about and sensitive to the perceived reality of classroom teachers. There is some evidence to suggest that the California trainer/developer was more closely aligned with these perceived realities.

Although both trainer/developers demonstrated a repertoire of understandings related to teacher education, as evidenced in observed behavior and self-reports, the California trainer/developer appeared to have a more eclectic and less well-defined approach to training than his Vermont counterpart. The Vermont trainer/developer, by conviction based upon prior experience and training in special education, was more firmly disposed toward a single paradigm for training. This might be called a rational-empirical model dependent upon specification of outcomes prior to instruction, linearity of planning and execution, and accumulation of evidence related to the accomplishment of specified objectives. Although she appeared to become more flexible and accepting regarding other training models during the course of the IR&DT implementation period, there were repeated attempts on her part to recast the team's decisions regarding training into the rational-empirical framework.

In terms of IR&DT outcomes, it is important to note that the first Vermont trainer/developer was characterized as being much more interested in human relations' processes than in educational research and development. He appeared to use the term "interactive" more in terms of team processes than for the interrelationship of r and d. In addition, he exhibited confusion as to which role functions were most appropriate to the IR&DT effort. The period of his membership on the Vermont team was significantly less task-oriented and IR&DT-specific than subsequent periods of the team's interaction. Because the period of his membership coincided with the critical research design formulation phase of IR&DT, upon which much, if not most, of the subsequent efforts were based, it is informally hypothesized that, had the second trainer/developer been a team member from the beginning of the effort, the consequences and processes of implementation would have been different.

Thus, team member characteristics appear to have important consequences for the manner in which the IR&DT strategy is implemented and the outcomes of the implementation. In addition, there is believed to be a relation between institutional history and successful IR&DT based upon the data collected for the implementation study. The more successful team was located in an organizational context which was marked by decades-long attention to issues of professional development; curriculum revision; innovative program development, implementation, and evaluation; involvement in state and federal special programs; support of an organizational unit designed to support and encourage professional growth; and so forth. The Vermont team, however, was located in a setting which had a history of sharply less attention to such issues. In California, then, there was a set of institutional norms, expectations, and support mechanisms which were barely present, if present at all, in the Vermont context. For the Vermont team, it was necessary to create a new setting. In contrast, for California it was necessary to determine how best to use the accustomed setting.

Site and participant selection are important antecedents to enactment of IR&DT in an "ideal form."

Technical Assistance Requirements

Three aspects of the IR&DT strategy make it essential to utilize technical assistance resources since each demands more expertise than one reasonably can expect to find on any given team. These aspects are: (1) the complexity of the problems teachers identify for study, (2) the use of multiple research strategies that most often is required by the problems that are selected, and (3) the ideological "shakeup" that is a "normal" occurrence in an IR&DT effort.

As persons and institutions change, support, guidance, and reassurance are needed. Typically, such help is requested from and provided by people external to the immediate setting in which change is occurring. IR&DT teams need this help.

From the beginning of the IR&DT experience, it was apparent that the technical assistance provided by the Far West Laboratory staff and a National Advisory Panel comprised of two researchers, a research/developer, and a teacher played an important role. The role played was what the term implies, assistance of a technical r and d nature. Occasionally, however, the role could be characterized as being more personal-professional. That is, in addition to offering r and d information and advice, it was beneficial to let the participants in the process know that "someone cared" about their efforts and to make public that caring. The importance of technical assistance of both types was seen during the implementation period in terms of the impact upon what was done, how IR&DT members felt about what was done, and the rigor and usefulness of the outcomes.

The teams differed in both the amount and type of technical assistance requested/required. The California team had 74 technical assistance contacts with Far West Laboratory staff during the development of their research design, 55 of which were substantive in nature and 19 of which dealt with administrative issues. Vermont had 95 technical assistance contacts during this same period, 51 of which were substantive in nature, 44 focused on administrative matters. The Vermont team also had an additional 26 contacts during the revision of their research design.

A more limited amount of technical assistance was requested/required during other phases of the r and d process. The California team had 17

contacts related to data collection and analysis, 16 related to their training effort, and 13 related to preparation of the final reports. The Vermont team had 22 contacts related to data collection and analysis, 9 related to training, and 20 related to final reports.

In addition to ongoing technical assistance from Laboratory staff and National Advisory Panel review, an orientation session was held prior to the launching of IR&DT at each site. These sessions were found to be a particularly important prerequisite for IR&DT. Further, the differences between the two teams at the time of entry into IR&DT - these differences becoming more evident over time - suggest that these orientations which purposely were similar in content and process should have been conducted differently with different foci and different emphases. Although it was not conceived as such, IR&DT, like other school change efforts, appears to be situationally-specific. That is, knowledge of the context and the participants should influence to a marked degree the nature and expected outcomes of IR&DT orientation. Most likely, such intervention should include training participants in the skills they lack given what has been learned regarding the relation between appropriate participant characteristics and successful IR&DT (see above discussion).

Rigor and Usefulness of IR&DT Outcomes

The outcomes of the team's r and d efforts were judged based on two constructs: "rigor," intended to convey strictly precise, exact, accurate adherence to scholarly inquiry in terms of methods and procedures; and "usefulness," meaning to be of practical use in doing one's work. Two approaches were used to establish the judgments, a jury system and a questionnaire rating

system. The outcomes of the juries' deliberations are reported here (see complete research report for other findings).

Six juries were organized to judge the teams' r and d outcomes for rigor and usefulness. Juries included (1) a jury of three researchers that judged the rigor with which research had been conducted as reflected by the research reports; (2) a jury of three researchers that examined the degree to which research as reported contributed to new knowledge and/or theory development; (3) a jury of two teacher educators and a staff developer that judged the rigor of the training as reported; and (4) three juries (a teacher jury, a staff developer jury, and a teacher educator jury) that judged the r and d outcomes from each site - both research and training as reported - for usefulness to their constituents.

Each jury met separately for one day. Jurors were asked (a) to develop criteria for either rigor or usefulness, whichever was the jury's focus; and (b) to use these to make independent judgments of each team's r and/or d in comparison with what the juror knew to be typical of educational r and d. Meetings were audio-recorded, transcribed, and served as the basis for the reports of jury deliberations. In addition, each juror reviewed the report of the deliberations for his or her jury for purposes of accuracy.

As a result of the judging of the IR&DT teams' r and d outcomes, conclusions can be drawn about the r and d outcomes resulting from use of the IR&DT strategy. In addition, because the juries were required to generate the criteria to be used in judging the teams' work, information also is available relative to the content and characteristics of these criteria.

Researchers judging the California IR&DT team's research found it to be somewhat more rigorous than typical educational r and d. As well, it was

judged to be moderately useful for knowledge building and theory development by the jury looking at usefulness of the research findings to other researchers. In terms of the rigor of the training, jurors found the California training to be slightly more rigorous than typical training programs. Teachers judged the total California r and d effort to be much more useful than typical educational r and d. Both the staff developer and teacher educator juries concurred with this judgment.

Vermont's research was judged to be somewhat less rigorous than typical educational research. Relative to the contribution of the research to knowledge building and theory development, the second research jury judged the Vermont problem to be of interest but the outcomes to be scarcely useful. The Vermont training program was judged to be slightly less rigorous than is typical for educational training programs. Teachers found the Vermont r and d effort as a whole to be not at all useful, but staff developers judged the total effort to be somewhat more useful than is typical for educational r and d and teacher educators judged it to be as useful as other educational r and d.

The criteria used to judge the IR&DT outcomes, in and of themselves, provided important information for the field of educational r and d.

The criteria used to judge rigor differed from those used to judge usefulness. For example, even though researchers who represented similar experiences and perspectives served on the juries, when asked to develop criteria for rigor or for usefulness, they tended to look at different aspects of the research. This occurred when criteria were given similar labels as well as when totally separate criteria were applied.

When the usefulness criteria developed and applied by teachers, staff developers, and teacher educators were compared, differences also appeared to exist. Generally, it can be said that the criteria developed by these practitioner groups reflected broadening interests in teaching and teacher training as one moved from the teacher to the staff developer to the teacher educator jury. Teachers focused almost exclusively on their constituency in generating criteria. That is to say, they stressed the immediate usefulness of the r and d in a classroom setting. Staff developers considered the needs of classroom teachers as well as themselves when generating criteria. Teacher educators included usefulness to teachers, teacher trainers - whether staff developers or teacher educators - and researchers. In addition, both the staff developer and the teacher educator juries chose to consider other collaborative r and d efforts with which they were familiar in developing and applying their usefulness criteria such that potential usefulness of the IR&DT strategy as enacted by each team could be judged as well as the individual team's r and d outcomes.

Criteria that were generated and judgments that were made indicated that what constitutes rigor does not necessarily constitute usefulness. For instance, in the case of the California IR&DT team's research, the rigor jury judged it to be somewhat more rigorous than typical educational research but the usefulness jury perceived it to be only moderately useful in terms of contributing to knowledge building or theory development. In addition, while the rigor jury found the Vermont IR&DT team's research to be somewhat less rigorous than is typical for educational research in general, the usefulness jury judged it to be only scarcely useful for knowledge production and theory development.

This contrast between rigor and utility also was revealed in the judgments rendered by juries looking at the training for the Vermont team. The rigor jury found the training program to be almost as rigorous as the typical educational training program. However, teachers judged this same training program to be not at all useful even though both the staff developer and teacher educator juries found some value in it. The rigor jury found the California team's training to be only slightly more rigorous than is typical of educational training programs, although when judging the topic as a training focus (single criterion), they indicated it was more rigorous. On the other hand, all three usefulness juries rated the California r and d to be much more useful than typical educational training programs.

Thus, it appears that a product - research or training - which adheres to rigorous standards cannot automatically be assumed to be useful. In that both rigor and usefulness are important considerations, based on the judgments made in this study it can be concluded that serious consideration should be given to validating the usefulness of "potential" r and d outcomes before undertaking rigorous procedures to produce them.

Reduction in R and D Time Lag

The implementation of IR&DT by the two teams demonstrated that IR&DT can reduce the typical time lag between production of research findings and development of training opportunities based on those findings. One reason for this reduction in time, it must be admitted, was the external imposition of contract requirements by Far West Laboratory which grew from its own contractual commitment with NIE. In addition to these externally imposed deadlines, dimensions of IR&DT also appear to have contributed to the reduced time lag.

First, both teams believed that the research procedures and team interactions during the first phases of IR&DT were so beneficial that they included these aspects of the IR&DT effort in the training opportunities they developed. Therefore, the processes which were adopted for training were ones which were familiar, had been experienced, and were conceptualized as a consequence of that experience and familiarity. Second, since the trainer/developer was involved in the r and d process from the beginning, it was not necessary for a "naive" developer to engage in the difficult and arduous tasks of translating and transforming the research processes and findings for the purpose of formulating a development vehicle. This overlap of procedures and persons in the form of IR&DT membership and activities is seen as a powerful contribution to the much more efficient r and d cycle which was demonstrated during the implementation.

It should be noted that all team members recommended that the time allotted to IR&DT be increased from 15 months to 24 months in future efforts. It is not known whether more time available would have enhanced the outcomes but even a 24-month cycle for research to implementation in the classroom would be significantly shorter than is typically the case.

IR&DT as an Intervention Strategy

Early in the IR&DT effort it was recognized that participation in an IR&DT effort could serve as a change and/or professional development vehicle for the sites and the participants.

Based on interviews with participants and observations in their classrooms and other work settings, it was shown that participants did increase their awareness of educational options and possibilities partly as a consequence of the requirements of systematic inquiry into schooling. One

outcome that was sharply evident was increased knowledge and skill regarding educational research and development. All members of both teams, through observation and self-reports, can be said to be more knowledgeable about, skillful in, and sensitive to research and development issues as a result of their participation in the implementation of IR&DT.

In addition, the historically persistent condition of teacher isolation was ameliorated for the participants. Teachers related one to another and to the researcher and trainer/developer in ways which were not typical. Institutional isolation, school from school and school from university, also was reduced to a degree. The concerns of the team and the actions upon those concerns "forced" interinstitutional relations.

Another intervention outcome was an increased belief that the work of other team members was of value and otherwise "prestigious" in their immediate workplaces and in the broader educational community. The combination of increased capacity to deal with r and d issues and the belief that the work which emerged out of that capacity was of positive value are seen as powerful antidotes to growing sentiments that teaching and teachers are of low status and low priority in terms of social action and reward systems at local and national levels of authority.

Although IR&DT did not have as an initial intention the significant alteration of professional practice by participants, such alteration did take place. Self-reports from participants indicated that teachers changed some of their instructional patterns, researchers learned and demonstrated new skills, trainer/developers revised and reordered certain beliefs and practices regarding teacher education, and so on. Some of these changes were a consequence of the issue under study in the teams' r and d efforts, some a result of the

processes engaged in during such study, and some related to the requirements of interaction with other educators. There also was an indication that participants began to rely less upon what might be called "conventional wisdom" and more upon prior research and/or expert testimony as their work proceeded. On both teams, although more markedly so for Vermont, initial discussions were informed more often by what individual participants had experienced than by findings from more systematic inquiries into the issues. Particularly true for teachers, less so for trainer/developers, and occasionally so for researchers, team members eventually came to question one another and others regarding the accuracy of statements, reports, formulations, and the like. It is believed that IR&DT contributed to this shift partly because of the requirements of conducting research and partly because of the technical assistance aspects of the implementation.

Cost Effectiveness

Several essential features of IR&DT suggest that the strategy should be more costly than other approaches to educational research in that unusual costs must be considered. In particular, teacher participation on the IR&DT team should add costs, e.g., payment of teachers for extra hours beyond the regular school day and/or hiring substitutes to release the teachers to work on the r and d team, that are not usual when research is carried out in absentia of regular, ongoing teacher input. The early and continuous involvement of the trainer/developer also is a cost item that typically is not included in a research effort.

Costs such as these must be counter-balanced by the extent to which the teachers and trainer/developer on an IR&DT team assume responsibilities that

would be carried out by paid research assistants in research efforts conducted within a conventional framework. When this is done, IR&DT costs may not vary to a significant extent from those for other approaches to r and d. Further, in assessing the cost of IR&DT efforts it must be kept in mind that both the California and Vermont teams completed the development of a research study and a teacher training program within a 15 1/2 month period. Once the research was completed, so was the development. This shortened time line actually may contribute to lowering overall r and d costs.

Including the costs of external review by the National Advisory Panel and the technical assistance offered by Far West Laboratory staff, the total costs for the r and d work of the California IR&DT team was $99,317. The Vermont team's cost was $88,153.

These costs are comparable with the cost of a typical research effort sponsored by a federal education agency. Further, if the typical cost of a federally funded research effort is combined with that for a typical development effort - which in a linear approach to educational r and d follows after the research as a separately funded activity - the costs for conducting r and d using the IR&DT strategy were surprisingly low. To obtain both research and training products for the amounts listed above was an economic path to take.

Conclusions and Recommendations

In summary, in the case of the California team, IR&DT resulted in research that was more rigorous than that produced by the typical educational research study at no more cost. Further, in terms of usefulness to practitioners, the more the IR&DT team's efforts evidenced the essential features of

the strategy, the more useful practitioners perceived the outcomes to be. That is, based on the IR&DT Study findings it can be said that when the teachers, researchers, and trainer/developers on an IR&DT team give a high degree of attention to the essential features that underlie the IR&DT strategy and carry out the role functions specified for each team member in a systematic, thorough manner, the outcomes of their work are considered to be applicable in the classroom by teachers, to be immediately useful for purposes of inservice teacher education by staff developers, and to have immediate use in preservice as well as inservice teacher education programs by teacher trainers who work in institutions of higher education. In addition, given the changes in persons and institutions that were observed in the IR&DT Study, the strategy appears to be a viable approach to educational change as well as to the conduct of r and d.

It should be noted that such outcomes of an r and d strategy are in marked contrast to the dim picture of the usefulness of educational r and d that is presented in much of the literature, particularly with respect to the ability of educational dissemination (change) efforts to bring about change (improvements) in persons and institutions involved in the educational process. IR&DT, particularly in terms of the California effort, appears to have "cracked" this wall of practitioner resistance while at the same time contributing new knowledge, procedures, and processes to the field of teaching that were derived rigorously.

Based on the findings of the IR&DT Study information that was obtained relative to the requirements for successful implementation of the strategy, we recommend that:

1. The IR&DT strategy be used for conducting a portion of the educational r and d effort at the national, state,

and local education levels. The more the r and d outcomes are intended to result in improvements in education that are to be used in classrooms by teachers, the more important the use of the strategy becomes.

2. Site and participant selection and/or training of participants prior to initiating IR&DT efforts are important antecedents to enactment of IR&DT in an "ideal" form. This is particularly important because ideal conduct of IR&DT is necessary for achievement of r and d outcomes that are more rigorous and more useful than "typical" educational r and d products.

3. Some form of external review and assistance is recommended for all IR&DT efforts.

4. Changes in resource allocations (funding/budgetary policies) of federal, state and local educational agencies will be necessary in order to utilize IR&DT extensively.

5. IR&DT should be implemented and studied in settings with participants other than those involved in the original implementation.